Christian Alberto Gomez (Person one)
Victor Herrera (Person two)
November 19,2021.
Instructor: Danie Mejia.
Programming Assignment 5.

I confirm that the work of this assignment is completely our own. By turning in this assignment, I declare that I did not receive unauthorized assistance. Moreover, all deliverables including, but not limited to the source code, lab report and output files were written and produced by my partner and I, alone.

1. Program Explanation

In this section, explain the overview of the assignment.
What did you do?
Programming Assignment 5 is a continuation of Programming Assignment 3 with the difference that we have new requirements to implement in our program. Once the instructions are read we can analyze that our program will need the code combination of 2 people and along with this add new features such as a new Design Patter, Handle exceptions and other things. As already mentioned, Programming Assignment consists of managing the purchase and sale of event tickets for TicketMiner. In this assignment we will have two main users (1) Customer and (2) Administrator. Depending on the user, the program will provide different options.

How did you tackle the problem?
As we already know, this Programming Assignment consists of the involvement of two people working on the same project. The way we both tackled this challenge was with the following points:

(1) Constant communication.
(2) Commit everyday any advance we did in the assignment.
(3) Always share ideas on how to improve each one's code.
(4) Share the work in an equivalent way.

It was through these points that the two of us were able to handle and solve this challenge for the next almost 3 weeks. Once this was clear, the programming part was fundamental because combining different codes turned out to be a difficult task. But due to the follow-up of the four previous points we were able to obtain the desired result for this assignment.

What techniques did you use to solve the problem?
The techniques we used for this Programming Assignment were the creation and manipulation of objects, saving data within these objects, the use of for-loops, while-loops, if-statements, and the use of BufferReader and BufferWriter to read documentation and generate text files or csv files with updated information after the execution of the program. It is worth mentioning that there was also an implementation of the Iterator Design Pattern, and finally the techniques / concepts of Object-Oriented Programming such as inheritance and composition of multiple classes in the program. All these tools and concepts were used to fulfill this Programming Assignment.

Did you break the problem into smaller problems? Explain.
During the code process there were situations where you had to do too many things in one action. For this we decided to break the problem into small problems which we could solve in other different methods. An example would be the following: Let's say the user wants to buy an event ticket with ID number 1 with a total of 3 VIP seats. The action sounds simple, but the process is difficult. We have to get all the information of the event ID 1, check if there are tickets for that event, check the balance of the customer, calculate the total to pay and update the information of the event and the client. This can be done in just one method, but it would take too many lines of code and it would become difficult to understand. For this reason, we decided to break the BIG problem into small problems.

2. What did I learn?

What did you learn as a result of this assignment?
During the process and conclusion of this Programming Assignment we had the opportunity to learn how to improve our programming skills, how to use more programming tools and concepts in the programming assignment and how to work efficiently collaborating as more than 1 person in the project. Within the skills as a programmer, we were able to learn how to adapt to situations that are not very conventional for us, such as combining codes from two different people, how to think more constantly outside the box, and how to improve the program's code. Moving to the tools and / or concepts we can say that the implementation of inheritance, composition, and Design Patterns allowed us to see from another angle how to develop a program. For example, the inclusion of a Design Pattern. For this programming assignment we take care of implementing the Iterator Design Pattern in our costumer and ticket class. For this we had to create two interfaces and an extra class where we could be saving, using and manipulating the customer information. This Design Pattern was a great example that with these tools we can write the code in a simpler and more efficient way. Finally, we have the inclusion of two people in the same project. This taught us how to communicate and work simultaneously.
How can my solution be improved?

What ideas do I have about another way to solve the problem?
One of the ideas we came up with was to use other Design Patterns like Singleton Design Pattern and Factory Design Pattern. Possibly one of these two would have helped us to simplify the code even more and make it in some way much more dynamic. On the other hand, the thought of changing the data structure was present but we decided not to do it for reasons of time that it would take us to redesign the program. In short, it can be said that the best way to improve our program is through the implementation of one or more Design Patterns in our programming code.

How long did it take me to complete this lab assignment?
As a conclusion we can declare that this Programming Assignment took us about 1 and a half weeks to complete and that it met the requested requirements. The assignment could be completed in a shorter time but due to problems and circumstances on the part of one of the team the tasks took longer than expected.

3. Solution Design

What did I do in this program?
Let's talk about how we made our programming code and what ideas / fundamentals we had behind this process. Since this programming assignment consisted of combining the code of both teammates, we decided to first discuss the overall progress we had with Programming Assignment 3 and the data structure that each implemented in their programming code. Once this clarified we could move on to the next process which was the code combination. Due to the fact that one of the team members (Victor) did not have several of the requirements and processes requested for programming assignment 3, we decided that we would implement the methods of one based on the ideology of the other. With this we mean to join both codes but at the same time optimizing them so that they could work simultaneously without any problem. The code works with a total of 19 classes which each one will have a fundamental purpose within the project, a total of 4 csv files which will contain the information of customers, events, venues and auto purchases, the use of a new design pattern, an ArrayList data structure, and the use of inheritance concepts. Once this is clarified, we can continue with the next point, which is what each thing does. Our program is structured in a way in which Event and Venue will be abstract classes. Sport, Concert and Special will be the children of Event while Stadium, Auditorium, Arena and OpenAir will be the children of Venue. The following will be the creation of multiple ArrayLists and an Object (this object will be based on the concept of the Iterator Design Pattern) which will help us to save the information of the csv files while we are reading these files line by line. The next step will be the creation of menus for Customers and Administrators. Each menu will have multiple options to execute a corresponding action. For example, if a customer decides to make a purchase, the program will be in charge of executing multiple steps and methods to fulfill the task of making the purchase of one or more tickets.

What was my approach to solving this problem?
Obtaining the data from the csv file correctly and that the user did not have any type of problem when wanting to make a purchase or obtain the information of an event that was inside the menu were the main approaches during this assignment. Through this approach, we were able to create a customer-friendly ticket purchasing system and an easy-to-manage purchasing system for the administrator. Another approach we had was how to take advantage of the information and access to methods that each class contained within the assigned task.

What data structures did I use? Why?
Analyzing the problem and the objective of the problem is why we decided to use ArrayList as the data structure within my solution. Why? ArrayList has many advantages that we are very comfortable with. 1) ArrayList has a size that does not need to be fixed. So, its size is more dynamic. 2) Elements can be inserted and deleted in any position, and 3) ArrayList has multiple methods with which we can manipulate objects much more easily. It is for these reasons that we chose ArrayList as part of my solution for this assignment.

What assumptions, if any, did I make?
The only assumptions given during the process and conclusion of this Programming Assignment were that the program executes correctly and fulfills its main task, which is the sale and purchase of event tickets. In other words, we can confirm that our programming code works efficiently and meets the requirements needed within the assignment. As an extra assumption, we both said that with the Iterator Design Pattern the code becomes much simpler and more efficient when

reading and executing it. We also decided to implement the Singleton Design Pattern in our program for the same reasons that we use the Iterator Design Pattern. These two design patterns were the ones that best suited our program and the requirements requested in the programming assignments. It is worth mentioning that the great advantage of the Singleton Design Pattern is that we are only making use of a single object to use multiple things. This gives us comfort when making code because we only have to deal with a single object and not with multiple objects at the same time during the programming of the code.

4. Testing

How did I test my program?
For the testing of the program, I was commissioned (Christian Gomez) to create a Suite Test where it will include a total of 8 testing methods. These methods would be in charge of verifying if the information saved was successful and especially if the manipulation of this information was successful. Another way of testing was running the program with multiple CSV files provided by Professor Mejia. In some cases, we used the PA3 CSV files and then the PA5 CSV files to check if the program could read and execute any CSV files. One more way of testing was to make multiple input options during the execution of the program. These inputs could be such expected inputs as unexpected inputs. The latter is because the code had to contain enough handle exceptions so that it could not be broken.

Did I use black-box, white-box testing, or both? Why?
White-Box testing was the way we did the tests in our code. Why? This is because we already know the structure of the code of my program. We are not doing a blind test where we do not know what is inside the program. This is one of the reasons why we decided on White-Box testing.

Did I test my solution enough? How can my testing practices be improved?
We consider that the tests that we did in this program were enough to identify the most common problems or errors that can occur to us. We repeat it, we consider that we did enough testing to fix basic or common errors when running it. One way that we can perhaps improve the text of my program is by modifying the CSV files to see what happens with the program. But in this case, the program should run and work as the CSV file is.

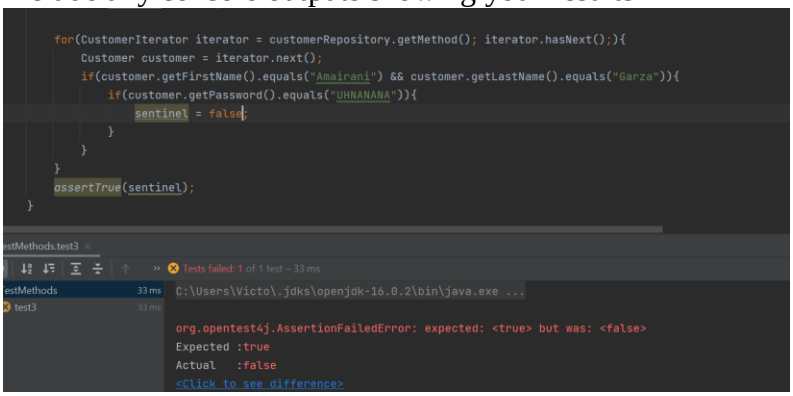
What are the test cases I used?
The test cases that we used were situations where we created an Object (using the Iterator Design Pattern concept) and we manipulated the information that was inside this object using targets such as first name, last name, etc. Other testing methods were in charge of verifying that the information was correct when using an Auto Purchase object.

Did I break my program and use that as a way to improve it?
There were multiple times where our program could be broken. The most common way in which we could break it is through inputs that were not expected. This was the main and biggest factor that helped us improve our code handle exceptions. This helped us create and improve a more maintainable and stable program.

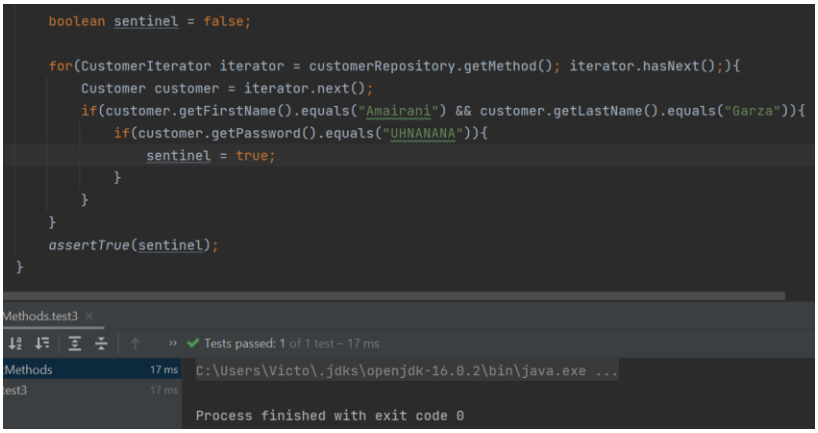
5. Test results

Describe the results of your tests.

Include any console outputs showing your results
Include any text document output as a result of your tests.
Describe the results of your tests.
Include any console outputs showing your results



Test results failed when providing incorrect input. This is checking if the information of the user is correct when setting the information to false and running the test case. Expected should be an error as seen above the error does exist. The original test case when sentinel is true returns correct output. As seen below this was tested with multiple outputs and the use of created customers.



Include any text document output as a result of your tests.

6. Code Review

Person One (Christian Alberto Gomez)

How did you feel about your partner's code?

This helped me to improve my skills and their code blocks helped me to see from another perspective how to create code. I also want to mention that my partner's code helped me understand much better the structure that the programming assignment should have. My partner really helped me to fix all bugs and missing requirements from the Programming Assignment. In summary, my partner did a good job with the programming coding. I really like the way he faced the bugs and the solutions he provided to the program.

What are some things they did that you liked?

Sharing and discussing different ideas on how to write programming code. Thanks to this I can understand much better the way of thinking of another person when programming. There were situations where my partner saw common mistakes that I could not see at first glance.

What were some things they did that you didn't like/didn't agree with?
From this Programming Assignment 5, everything was really good with the efficiency of my partner. I don't thing there is something I really did not like during this programming assignment 5.

How did looking at another person's code change your understanding of the Bank system?
Looking at certain parts of my partner's code helped me think a bit outside the box and implement new programming styles. This was a very effective way to further develop my programming skills.

Person Two (Victor Herrera)
How did you feel about your partner's code?
I felt that methods provided were consistent from previous Assignment and with this It allowed me to put in more work in finding errors and creating methods and classes to make the program more functional.
What are some things they did that you liked?
As mentioned, I liked the algorithms he came up with when implementing certain features of the program such as buying tickets, or automatic purchase. Looking at the way the algorithm gave me a more of insight on how to structure future algorithms.
What were some things they did that you didn't like/didn't agree with?
For this assignment I felt there were no issues since my disagreements were mentioned in previous assignment as the program menu was set up. For this assignment I felt everything was more fluid and we contributed to the program's overall functions.
How did looking at another person's code change your understanding of the Miner Ticket?
Looking at the code was something not new as we exchanged code from previous assignments but looking at it again for this Assignment it allowed me to get a deeper look into the structure of algorithms. I take this information and try to break it down to lower levels of understanding and then rebuild the algorithms with cases that will not fail, not always the outcome, but I try to understand it more. This was great experience; I am a visual learner at times and things of this nature provided a great deal of information which I will continue to use in the future.

7. Reflection

Overall, this exercise provided more time on how to work with others especially when it comes to writing code. Writing code can be tedious if the program exceeds 500 lines of code. Now working with a team member and having over 1000 lines of code was a bit difficult. When it came to making changes, communication was a necessary. This provided a way to keep constant communication something that will be used out in industry I feel.
Describe the problems you faced, and how you solved them?
We face issues from program not handling certain cases or staying in loop where there was no way to exit or return to a previous function. To solve this more classes and methods were added to make the code more dynamic.

8. **Demo of another team**

Who demo'd to you?

-Edgar Garnica, Ruth Avila and Ximena Parada.

Did you understand their process to perform tasks?

-Yes, absolutely. The way they perform the task was good and easy to understand.

Did they provide you with Javadoc?

-No. Since we were running out of time, they could not show us their Javadoc. But we can say that all their code was documented and ready for the Javadoc.

Did you break their code? How?

-There were 3 ways we broke their code. The first attempt was trying to get the information from a non-existent event such as event with ID 888. The second attempt we introduce the word "apple" and the code failed. Finally, the third attempt was about adding a duplicate event. Here, they did not implement a way to avoid add duplicate events.

Did they meet all functionality requirements?

-95% of all requirements were complete and worked. The only thing they missed was displaying the event information by just enter the event name.

9. **Demo for another team**

Who did you demo with?

- Edgar Garnica, Ruth Avila and Ximena Parada.

Did you provide them with enough information in the console prompts?

-Yes. All what they need was in the console. The only thing we missed was adding an EXIT option at the beginning of the program.

Did you provide them with Javadoc?

-As we said, both teams were running out of time, so we can only see the Javadoc comments in their codes. But answering the question, we can say yes. There was a lot of Javadoc documentation in our code.

Did they break your code? What did you learn from it?

-Yes. There was one way they broke our code. Edgar tried to add a new event with a different venue that was expected. For example, Edgar added a Sport event using Centennial Plaza as venue. This action broke our code since we forget to declare that all venues are available for any type of event.

Did you meet all the functionality requirements?

-Yes. Our program meets all the requirements that were ask during the past programming assignments. Right now, we are working to fix the part where they broke our code. For more than that everything is good.

Person One (Christian Alberto Gomez)

What did I do to contribute to this?

For Programming Assignment 5 I was in charge to test the program, review requirements, and fix many bugs (not all of them). Also, documentation was one of my duties during this programming assignment. For the documentation, my job was checking and completing all word documents required for this programming assignment such as check if everything looks good and edit some parts of the Lab report, UML diagrams, csv files updated, and all the text files generated by the program.

How did I help solve the problem?
Contributing with multiple ideas such as methods and classes. Also, a way that he offered to help with the fulfillment of this assignment was that they made calls / video calls where we were talking and sharing points of opinion about the code.

How much did I do in this assignment?
If we put it in percentages, my partner and I did 50% and 50%. This time the tasks distribution was very balanced comparing from the last programming assignment. Most of my job was reviewing and testing in many ways our program to check any bug. As I said, also documentation was part of my job during this programming assignment.

What did I learn from working with a teammate?
Constant communication and committing any changes to the code is the most important. If there is no communication and if one of the partners does not tend to commit his parts of the code, the task becomes very complicated to fulfill.

Person Two (Victor Herrera)
What did I do to contribute to this?
I was in charge of writing Code Review and refactoring code to fix any exceptions that were not caught in previous assignment. Added additional methods to class diagram. Contributed to the overall PowerPoint presentation. Uploading any changes to program and notifying my partner as to update the code that was to be submitted.
How did I help solve the problem?
I provided more classes and methods to handle errors or loops that did not have an exit. Maintained constant communication with Christian as what else needed be completed this way it could be done promptly.
How much did I do in this assignment?
I felt this assignment was evenly spread, not like the last assignment where I did lack in some areas. To put in percentages, I put in 50% as did Christian.
What did I learn from working with a teammate?
I learned more about working in teams and how to maintain communication and how working together and each putting their amount of work makes accomplishing the task that much simpler.